

**AMENDMENTS TO THE DRAWINGS**

The attached Sheets of drawings include amendments to figures 2-8. Element numbers "5, 6" have been corrected to read "5a, 6a" as discussed with the Examiner via telephone, and as supported in the Specification.

**REMARKS**

Reconsideration and withdrawal of the rejections of the application are respectfully requested in view of the above amendments and following remarks.

**I. STATUS OF THE CLAIMS AND FORMAL MATTERS**

Claims 1-7 are currently pending. Claims 1-6 were rejected. Claims 1-6 are hereby amended.

The Examiner objected to claim 7 under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend on another multiple dependent claim (claim 4.) Claim 4 has been amended to overcome the objection.

Applicant has amended the drawings to correct minor errors, as described above. Applicant submits herewith corrected drawing sheets.

**II. THE REJECTIONS UNDER 35 U.S.C. § 112**

Claims 3-6 were rejected under 35 U.S.C. §112, second paragraph, as failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claim 3 has been amended to replace the term “the pushing surface” with the term “the pushing wall” to properly provide an antecedent basis for this limitation in the claim.

**III. THE REJECTIONS UNDER 35 U.S.C. § 103(a)**

Claim 1 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Manual Tecnico and Denasa Detonantes (hereinafter “Manual Tecnico”). Claims 2-6 were rejected

under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,594,703 to Holtzapple (“Holtzapple”).

Claim 1 recites:

“A pyrotechnical firing installation for use in a firing program, the firing installation comprising

a plurality of detonators (3, 4), each detonator provided with an electrical cable (5, 6) comprising an end connector (7, 8) at the end of a terminal or end part (5a, 6a) of the electrical cable (5, 6) and at least two connection conductors, and

a surface line to which the electrical cable of each detonator is connected via the electrical cable’s end connector,

wherein the surface line is at least partially formed by successive sections of the electrical cables of the plurality of detonators, every section comprising the terminal or end part (5a, 6a) of one of the electrical cables (5, 6) coming from one of the plurality of detonators (3, 4) and the end connector (7, 8) of the electrical cable, at least a part of the end connector penetrating into the inside of the cable ensuring electrical connection of the respective connection conductors of the successive sections of the electrical cables in order to electrically connect the terminal or end part (5a, 6a) of one electrical cable to the electrical cable of the next detonator thereby defining the origin of the next detonator’s terminal or end part anywhere on the electrical cable of the next detonator.” (Emphasis Added)

Applicant submits that the non-electrical firing installation disclosed in Manual Tecnico fails to teach or suggest at least a part of the end connector penetrating into the inside of the cable ensuring electrical connection of the respective connection conductors of the

**successive sections of the electrical cables in order to electrically connect the terminal or end part (5a, 6a) of one electrical cable to the electrical cable of the next detonator.**

As understood by Applicant, Manual Technico discloses a non-electrical firing installation formed by detonator units which consist of lengths of shock tubes, each shock tube having a surface detonator attached to one end and an in-hole detonator connected to the other end of the shock tube. A shock tube is typically coated with a reactive material on the inside, which, when initiated, transmits a low energy transmission signal similar to a dust explosion. The surface detonator of the EZ-Det system is located inside a plastic EZ-Det connector block to facilitate a connection to shock tube leads.

The operation of *non-electrical* firing installations is dependent on the detonation of the surface detonators, the low energy transmission signal (dust explosions in the shock tubes), as well as the detonation of the in-hole detonators. The connection of the plastic EZ-Det connector block to the shock tube leads is a loose connection, as the transmission of the low energy signal is dependent only on physical properties of a detonation transmitting the low energy transmission signal from the shock tube running from one of the in-hole detonators to the shock tubes running to other in-hole detonators. (Shock tubes may under no circumstances be damaged or pierced, as this would have a detrimental impact on the security and reliability of the firing installation.)

In contrast, an *electrical* firing installation is dependent on the transmission of electrical signals to respective electronic detonators. These electrical signals provide the underlying advantages of electrical detonating systems in that a control unit may identify every detonator in a firing installation by a serial number and may apply a delay time which will determine the moment of ignition of the charge in relation to a general firing signal for each respective detonator (mentioned on page 1 of the specification).

As further explained in the background of the invention, the requirement of electrically transmitting signals necessitates that the end of a cable which connects to an electronic detonator carry connection means that make it possible to connect to a two-wire line running over the firing range, i.e., the surface line, which two-wire surface line is necessary to complete the electrical circuit running between the control unit and the detonators.

The configuration of the present invention remedies drawbacks of existing electronically controlled detonator systems which require a two-wire bus. The invention provides that every detonator is equipped with only one cable (comprising at least two conductors) for its connection to the programming and firing control means and to the other detonators of the firing plan. There is therefore no longer a special electrical cable dedicated to the formation of a surface bus for the control and power supply of the detonators of the firing installation. Also, the end connector of the present invention makes it possible to easily connect electrical wires of cables necessary to complete the electrical circuit of the firing installation, without baring the electrical wires, in the process forming a two-wire line running over the firing range. Manual Tecnico fails to teach or suggest such requirements relating to electrical firing installations, specifically at least a part of the end connector penetrating into the inside of the cable ensuring electrical connection of the respective connection conductors of the successive sections of the electrical cables in order to electrically connect the terminal or end part (5a, 6a) of one electrical cable to the electrical cable of the next detonator.

For at least the above reasons, claim 1 is patentable.

With regard to the Examiner's rejection of claims 2 to 6 as being unpatentable over Manual Tecnico in view of Holtzapple (US 3,594,703), we firstly submit that, in the light of our arguments above relating to non-electrical firing installations and the end connector penetrating,

in use, into the inside of the electrical cable coming from another detonator, the examiner erred in relying on Manual Tecnico and further in combining this document with Holtzapple.

Moreover, we submit that Holtzapple does not disclose the features as claimed in claims 2 to 7.

As understood by Applicant, Holtzapple describes a rudimentary electrical tapoff connector that is used to grip, hold and connect a conductor of a tap wire with a cable by piercing the insulation of the cable. We point out that the Holtzapple connector is not integral with either the tap wire or the cable and that Holtzapple does not teach or suggest an arrangement where the connector is solid with the tap wire or cable. Also, in order for the conductor and the cable to be connected, the conductor of the tap wire is pre-stripped and disposed in a slot of the floor of the connector (column 2, lines 12 to 13). The electrical connection between this tap wire and the cable is through the electrical conductive path provided by the aluminum block member 4 receiving the stripped wire and the screw 6 which pierces the insulation of the cable.

In contrast, the present invention provides a connector having a first part which is solid with the end of an electrical cable which comes from a detonator. Claim 2 further defines that the first part of the connector is provided laterally with connection pins to electrically connect to respective conductors of the electrical cable. These features are not described or suggested by Holtzapple.

Applicant submits that the direct electrical connection provided by the aluminium block member 4 and the screw 6 between the conductors of the cable and the tap wire makes it impossible to respectively connect separate conductors of one cable to separate conductors of another cable. Mere duplication of the screw 6 combined with multiple slots 22 to receive multiple conductors would not provide the electrical insulation necessary between different conductors of the cable to connect these conductors. We further point out that the present invention specifically aims to connect sections of cable comprising at least two conductors in order to form the surface line

necessary to connect to electronic detonators. Moreover, the rudimentary Holtzapple connector which makes use of pre-stripped wires would not be suitable for a firing installation, as it would be unreliable and unsafe.

For at least the above reasons, claim 2 is patentable.

#### **IV. DEPENDENT CLAIMS**

The other claims are dependent from independent claims 1 and 2, discussed above, and are therefore believed patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

#### **CONCLUSION**

In view of the foregoing amendments and remarks, Applicant respectfully submits that all of the claims are in condition for allowance and requests early passage to issue of the present application.

In the event the Examiner disagrees with any of statements appearing above with respect to the disclosure in the cited references, it is respectfully requested that the Examiner specifically indicate those portions of the references providing the basis for a contrary view.

The Commissioner is authorized to charge any additional fees that may be required to Deposit Account No. 50-0320.

Respectfully submitted,  
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